HARTZELL PROPELLER INC.

Aircraft Accident/Incident Report No.: 130809

Date of Accident: August 9, 2013

Location: New Haven, CT

NTSB File No.: ERA13FA358

Aircraft: Rockwell International 690B

Registration No.: N13622

Serial No.: 11469

Operator: per FAA registry:

Written by: Daniel Boggs
Air Safety Investigation Manager

Date: September 2, 2013

Contents:

ACCIDENT SYNOPSIS

According to the NTSB preliminary report, the aircraft was cleared for the Instrument landing system approach to runway 2, circle to land on runway 20 at New Haven airport. The controller asked the pilot if he had the airport in sight and the pilot stated it was in sight now. The controller then cleared the aircraft to land and no further communications were received from the plane.

Aircraft Damage: Destroyed
Injuries: 2 on board, 4 fatal

SUMMARY AND ANALYSIS OF FINDINGS

Both propellers experienced thermal damage. Several blades were melted with portions missing. Both propeller spinners were fragmented and melted in some areas. Both propeller cylinders and pistons were fractured off the hub units.

Left propeller:
The left propeller had severe thermal damage. The cylinder and piston were fractured off the hub unit. One blade was fractured off at the blade butt. All the blades were spinning freely in the hub and an accurate blade angle could not be established. The propeller was driven hard into feather and left impression marks by the feather stops into the piston.

Right propeller:
The right propeller was fractured off the engine. The mounting flange was fragmented in several places. The propeller was thermally damaged and an accurate blade angle could not be established.

CONCLUSIONS

A power setting could not be established due to thermal and impact damage.

There were no discrepancies noted that would preclude normal operation. All damage was consistent with impact damage.

PROPELLER TEARDOWN REPORT

Date of Investigation: August 11, 2013

Location: Central Aircraft.
Plainville, CT.

Propeller Model: HC-B3TN-5 with 10876-2Q blades

Representatives: Dan Boggs Hartzell Propeller Inc.

General Comments:

This type propeller is a 3-blade single-acting, hydraulically operated, constant speed model with feathering and reversing capabilities. Oil pressure from the propeller governor is used to move the blades to the low pitch (blade angle) direction. Blade mounted counterweights and feathering springs actuate the blades towards the high pitch direction in the absence of governor oil pressure. The propeller incorporates a Beta mechanism that actuates when blade angles are lower than the flight idle position. The blades are of aluminum construction. The hub and blade clamps are steel. Propeller rotation is clockwise as viewed from the rear.

Installation Data: (Data reference the 30-inch station)

Reverse:	-18.0± 0.5 degrees
Start Lock:	-6.0 ± 0.5 degrees
Feather:	80.0 ± 0.5 degrees
Counterweight	positive

Service History:

	S/N	Date of manufacture	TTSN	TSO
Left Hub	BUA23078	January 24, 2000	unknown	unknown
Blades	J98771	April 1, 2004	unknown	unknown
	J98772	April 1, 2004	unknown	unknown
	K01945	April 1, 2004	unknown	unknown
Right Hub	BUA28710	April 23, 2004	unknown	unknown
Blades	K01951	April 23, 2004	unknown	unknown
	K01953	April 23, 2004	unknown	unknown
	K01950	April 23, 2004	unknown	unknown

Position **Right**

Hub Serial Number: BUA28710 **Factory No.:** C6666A

Blade Model: LT10876ANS-2Q

S/N R1: K01951
S/N R2: K01953
S/N R3: K01950

Blade Orientation:

The blades were identified as R1-R2-R3 clockwise as viewed from the rear of the propeller. The hub serial number was between the R2 and R3 blades.

"As Received" Condition:

See pictures on page 5.

The propeller was thermally damaged. The spinner dome was partially missing and only fragmented pieces remained. The blade tips were melted. The cylinder and piston were fractured off the hub. The R3 blade was fractured off the hub and the lower half of the R3 clamp was missing.

Spinner Dome:

The spinner dome was fragmented and only small pieces remained. The spinner was thermally damaged.

Spinner Bulkhead:

The bulkhead was bent forward and aft in several areas, otherwise it was intact.

Propeller Cycling:

The propeller cycling was not possible due to impact damage.

Photo #1, Right propeller as received.

Photo #2, right propeller as received.

Engine/Propeller Mounting:

The mounting flange was fragmented. All eight bolts were missing.

Blade/Clamp Rotation:

The R1 and R2 did not rotate in the clamps, the R3 bottom half of the clamp was missing and the blade was pulled from the clamp.

Pitch Stops:

Low Pitch Stop: The low pitch stop was intact and unremarkable.

Feather Stop: The feather stop was intact and unremarkable.

Beta rods: The beta rods were bent.

Piston:

The piston was intact, it had small amounts of thermal damage and a scrapes from impact damage.

Link Arms:

The link arms were still attached to the piston, however, they all pulled off the blades and the attachment holes were elongated.

Cylinder:

The cylinder was jammed into the piston and had to be removed by force. The cylinder was bent in several areas due to impact damage. The cylinder was fractured off the hub.

Feathering Spring Assembly:

The feathering spring assembly could not be removed from the cylinder due to the lack of proper tooling in the field. It looked to be intact and unremarkable.

Pitch Change Rod:

The pitch change rod could not be observed due to the lack of tooling in the field.

Clamps and Counterweights:

The R1 and R2 counterweights were missing. The clamps were intact. The R3 clamp was missing the bottom half.

Clamp serial numbers:
R1: EM17245
R2: EM17102
R3: Unknown, thermally damaged.

Hub Unit:

The hub unit had some thermal damage. The R3 pilot tube was fractured off in the blade. The R1 pilot tube pulled out of the hub and remained in the blade. The mounting flange was fractured in several areas and all eight bolts were missing. The cylinder attachment point was stripped due to the cylinder being pulled off during impact. There were no impression marks from the blade butts.

Blades:

See pictures on page 8.

Blade # R1

paint, camber side	-	missing, thermally damaged.
paint, flat side	-	missing, thermally damaged.
bend	-	slight bend aft.
twist	-	none.
lead edge damage	-	scrapes, tip missing due to thermal damage.
trail edge damage	-	scrapes, tip missing due to thermal damage.
butt impression	-	small impression from hub.

Blade # R2

paint, camber side	-	missing, thermally damaged.
paint, flat side	-	missing, thermally damaged.
bend	-	90° bend forward at midblade.
twist	-	none.
lead edge damage	-	scrapes, tip missing due to thermal damage.
trail edge damage	-	scrapes, tip missing due to thermal damage.
butt impression	-	none.

Blade # R3

paint, camber side	-	missing, thermally damaged.
paint, flat side	-	missing, thermally damaged.
bend	-	slight bend aft at midblade.
twist	-	slight twist at midblade forward.
lead edge damage	-	scrapes, tip missing due to thermal damage.
trail edge damage	-	scrapes, tip missing due to thermal damage.
butt impression	-	small impression from hub.

Photo #3, Right propeller blades

Photo #4, Right propeller blades.

Position **Left**

Hub Serial Number: BUA23078 **Factory No.:** C6664A

Blade Model: LT1010876ANS-2Q

S/N L1: J98771
S/N L2: J98772
S/N L3: K01945

Blade Orientation:

The blades were identified as L1-L2-L3 clockwise as viewed from the rear of the propeller. The hub serial number was between the __L3__ and__L1____blades.

"As Received" Condition:

See pictures on page 10.

The propeller had severe thermal damage. The spinner dome fragmented and only small pieces remained. The cylinder and piston were fractured off the hub. The L3 blade was fractured about 12" from the blade butt.

Spinner Dome:

The spinner dome was fragmented and only small pieces remained on the bulkhead. Areas were thermally damaged.

Spinner Bulkhead:

The bulkhead was bent in all directions and had gouges around the edge.

Propeller Cycling:

The cycling of the propeller was not possible due to impact damage.

Engine/Propeller Mounting:

The propeller was mounted to the engine but was removed by the engine accident investigator for engine shipment.

Photo #5, Left propeller as received.

Photo #6, Left propeller as received.

Blade/Clamp Rotation:

The L1 and L3 blades did not rotate in the clamps, the L2 had rotated about 30° in the clamp.

Pitch Stops:

Low Pitch Stop: The low pitch stop was intact and thermally damaged.

Feather Stop: The feather stop was intact and thermally damaged.

Beta rods: The beta rods were thermally damaged, otherwise intact and unremarkable.

Piston:

The piston had severe thermal damage. The feather stop screw heads were forced into the piston during impact leaving deep impression marks on the inside of the piston.

Link Arms:

The link arms were still attached to the piston however, they all pulled off the blades and the attachment holes were elongated. All three link arms showed signs of severe thermal damaged.

Cylinder:

The cylinder was intact but showed signs of severe thermal damage.

Feathering Spring Assembly:

The feathering spring assembly could not be removed from the cylinder due to the lack of proper tooling in the field. It looked to be intact and but thermally damaged.

Pitch Change Rod:

The pitch change rod could not be observed due to the lack of tooling in the field.

Clamps and Counterweights:

The clamps and counterweights were all thermally damaged, otherwise intact.

Clamp serial numbers:
L1: EM17096
L2: EM17246
L3: EM17092

Hub Unit:

The hub unit showed signs of severe thermal damage. The L1 pilot tube remained with the blade. The cylinder attachment threads were stripped off due to the cylinder being forced off during impact. The L1 blade left an impression mark at the 9 o'clock position. It was the "Hartzell" name and when the blade was aligned with the marks, it showed the blade 180° out of low pitch.

Blades:

See pictures on page 13.

Blade # L1

paint, camber side	-	missing, thermally damaged.
paint, flat side	-	missing, thermally damaged.
bend	-	bent aft, tip curled under.
twist	-	none.
lead edge damage	-	bends and scrapes.
trail edge damage	-	scrapes.
butt impression	-	hub mark on trailing edge.

Blade # L2

paint, camber side	-	missing, thermally damaged.
paint, flat side	-	missing, thermally damaged.
bend	-	bent aft 60° midblade, forward at tip.
twist	-	slight twist forward and aft.
lead edge damage	-	Last ¼ of blade missing, thermally damaged.
trail edge damage	-	gouges and some tears.
butt impression	-	hub mark on trailing edge.

Blade # L3

paint, camber side	-	missing, thermally damaged.
paint, flat side	-	missing, thermally damaged.
bend	-	fractured 10" from blade butt.
twist	-	tip curled under.
lead edge damage	-	bends at tip.
trail edge damage	-	bends at tip.
butt impression	-	hub mark on trailing edge.

Photo #7, Left propeller blades

Photo #8, Left propeller blades.

PHOTOGRAPHIC SUMMARY

NOTE: The following digital photographs are original and unedited and available on compact disc. The numbering sequence may not be chronological as some may have been deleted if out-of-focus, too dark, redundant, etc. Photos used in the text of this report are taken from photos on this list but may have been adjusted from the original. Modifications to images used in the report are limited to cropping, magnification, file compression, or enhancement of color, brightness, or contrast for the sole purpose to improve clarity of the report. No other alterations are permitted.

PHOTOGRAPH NUMBER	DESCRIPTION
P1000495.JPG	Left prop as received
P1000496.JPG	Right prop as received
P1000497.JPG	Right prop as received
P1000498.JPG	Right prop as received
P1000499.JPG	Right prop as received
P1000500.JPG	Piston/cylinder assembly
P1000501.JPG	Right prop R3 blade and R3 clamp
P1000502.JPG	Right prop mounting flange
P1000503.JPG	Right prop mounting flange
P1000504.JPG	Right piston measurement
P1000505.JPG	Right piston measurement
P1000506.JPG	R3 hub butt, fractured pilot tube
P1000507.JPG	R2 hub butt
P1000508.JPG	Right hub serial number
P1000509.JPG	Right hub serial number
P1000510.JPG	R1 hub butt, pilot tube removed
P1000511.JPG	Right hub unit
P1000512.JPG	R1 blade, pilot tube attached
P1000513.JPG	R2 blade
P1000514.JPG	R3 blade, fractured pilot tube
P1000515.JPG	Right propeller blades
P1000516.JPG	Right propeller blades
P1000517.JPG	R3 blade, melted tip
P1000518.JPG	R1 blade, melted tip
P1000519.JPG	Clamps/counterweights
P1000520.JPG	R3 clamp half, bottom missing
P1000521.JPG	R2 clamp, counterweight missing
P1000522.JPG	R1 clamp, counterweight missing
P1000523.JPG	Clamp serial numbers
P1000524.JPG	Clamp serial numbers
P1000525.JPG	Piston
P1000526.JPG	Cylinder unit
P1000527.JPG	Cylinder unit
P1000528.JPG	Left propeller as received
P1000529.JPG	Left propeller as received
P1000530.JPG	Left propeller as received

P1000531.JPG	Cylinder unit
P1000532.JPG	L1 blade with hub unit
P1000533.JPG	L1 blade aligned with impression mark
P1000534.JPG	L1 blade aligned with impression mark
P1000535.JPG	Hub unit
P1000536.JPG	Hub unit
P1000537.JPG	L1 hub impression mark
P1000538.JPG	L2 hub
P1000539.JPG	L3 hub
P1000540.JPG	Clamps and counterweights
P1000541.JPG	L1 clamp and counterweight
P1000542.JPG	L2 clamp and counterweight
P1000543.JPG	L3 clamp and counterweight
P1000544.JPG	Cylinder unit
P1000545.JPG	Cylinder unit
P1000546.JPG	Pitch change rod end
P1000547.JPG	Piston
P1000548.JPG	Inside piston, impression marks
P1000549.JPG	L1 blade butt
P1000550.JPG	L2 blade butt
P1000551.JPG	L3 blade butt
P1000552.JPG	Left propeller blades
P1000553.JPG	Left propeller blades
P1000554.JPG	Left propeller blades